R. B. WILLIAMSON.

UNLOADING DEVICE FOR MOTORS.

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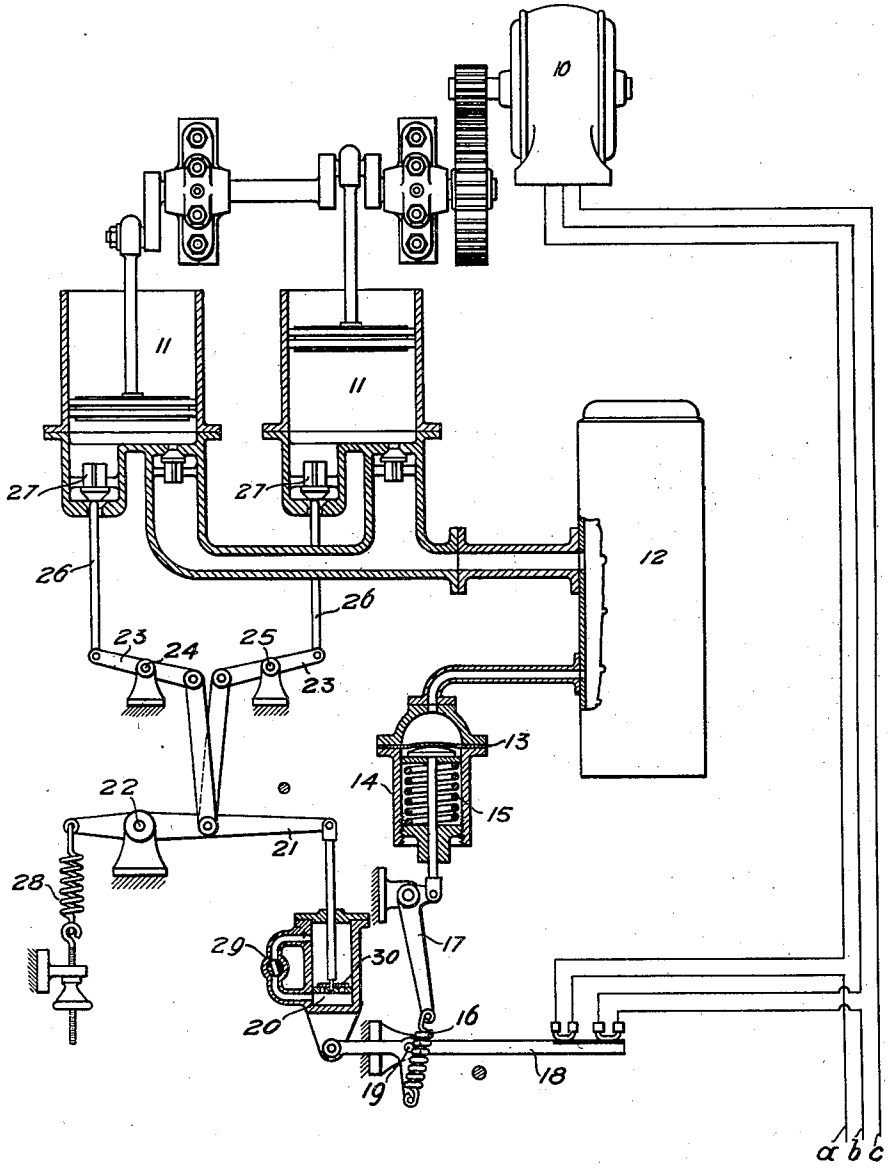
1,017,939. Patented Feb. 20, 1912.



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UNLOADING DEVICE FOR MOTORS.

1,017,939. Specification of Letters Patent. Patented Feb. 20, 1912.

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To all whom it may concern:

Be it known that I, ROBERT B. WILLIAMSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Unloading Devices for Motors, of which the following is a full, clear, and exact specification.

My invention relates to unloading devices for motors, especially electric motors driving fluid pumps.

In driving air compressors or other pumps by electric motors, the motors draw several times the normal full load current from the line during starting if the pump or compressor is connected to the fluid reservoir. This is very objectionable, especially when the pumps and motors are of a large size. In order to avoid this excessive current, arrangements have been proposed for allowing the pump-driving motors to run unloaded for a predetermined time after their circuits have been closed.

It is the object of my invention to provide an unloading device for motors, especially those driving pumps, which is both simple and inexpensive, but withal reliable and efficient. I have provided an arrangement in which the unloading device for the motor and the pump is automatically operated mechanically by the closing of the switch in the circuit of the motor; and is automatically rendered inoperative some time later.

The various novel features of my invention will be apparent from the specification and drawings and will be particularly pointed out in the claims.

The single figure of the drawing shows diagrammatically one embodiment of my invention.

The motor 10 drives the pump or pumps 11 to supply air to the reservoir 12. The motor may be of any desired type. It is here shown as a three-phase induction motor. The pump or pumps 11 may also be of any desired type, single or double acting. They are here shown as single acting air compressors.

As the pressure in the reservoir 12 falls, the diaphragm 13 of the pressure governor 14 is forced upward by the spring 15 until the minimum for which the governor is adjusted is reached, when the upper end of the spring 16 will have been moved far enough to the right by the bell-crank lever 17 to cause the switch 18 to snap in a counter-clockwise direction about its fixed pivot 19 to closed position. The closing of the switch 18 admits current from the mains *a*—*b*—*c* to the motor 10. The switch lever 18 carries the cylinder of a dash-pot 20, the piston of the dash-pot being connected to the lever 21 carried by the fixed pivot 22, and the lever 21 in turn being connected by links to two levers 23 pivoted at 24 and 25 respectively and carrying rods 26. Through this connection the closing of the switch 18 raises the rods 26 to lift the inlet valves 27 of the air-compressor from their seats, acting against the adjustable spring 28. Immediately upon the closing of the switch 18, however, the spring 28 begins to raise the piston of the dash-pot 20 to allow the rods 26 to fall. The rate at which this action takes place may be adjusted in any desired manner, as by an adjustable bypass 29 connecting the two ends of the cylinder of the dash-pot 20. The bypass 29 and the spring 28 are so adjusted that the motor 10 and pumps 11 have practically gotten up to speed by the time the rods 26 are moved out of engagement with the inlet valves 27, and the latter are permitted to perform their regular function as inlet valves of the compressor. This arrangement permits the motor to start practically without load, and prevents it from drawing any excessive current from the line.

As the compressor operates and the pressure in the reservoir 12 increases, the diaphragm 13 of the pressure governor 14 is moved against the spring 15 until the maximum for which the governor is set is reached. Then, the upper end of the spring 16 having been properly moved to the left by the bell-crank lever 17, the switch 18 is opened with a snap action, thus cutting off the supply of current to the motor 10. This movement of the switch 18 does not affect the rods 26 of the spring 28, for the valve 30 in the dash-pot piston permits the dash-pot cylinder to slide rapidly upward without moving the piston.

When the pressure again falls to a minimum, the operation above described is repeated.

Many modifications may be made in the

precise arrangement here shown and described, and all such which do not involve a departure from the spirit and scope of my invention I aim to cover in the following claims.

What I claim as new is:—

1. In combination, a motor, a pump driven thereby, means controlling the supply of power to the said motor, unloading means for the pump, and a mechanical connection between said power-controlling means and said unloading means whereby the operation of the former to admit power to the motor operates the latter to unload the pump.

2. In combination, a motor, a pump driven thereby, a reservoir supplied by the pump, means automatically controlled in response to the amount of the fluid in the reservoir for controlling the supply of power to the motor, normally inoperative unloading means for the pump, and a mechanical connection between said unloading means and said power-controlling means whereby the movement of the latter to power-admitting position renders the former operative.

3. In combination, a motor, a pump driven thereby, a reservoir supplied by said pump, means controlled by the amount of the fluid in the reservoir for controlling the supply of power to the motor, means for unloading the pump, said unloading means being biased to inoperative position, and a slowly yieldable mechanical connection between the power-controlling means and the unloading means whereby the operation of the former to admit power to the motor operates the latter to unload the pump for a predetermined time after power is admittted to the motor.

4. In combination, an electric motor, a pump driven thereby, a reservoir supplied by said pump, a switch in the motor circuit and responsive to the fluid pressure in the reservoir, unloading means for the pump, and a mechanical connection between the switch and the unloading means whereby the latter is operated by the closing of said switch.

5. In combination, an electric motor, a pump driven thereby, a reservoir supplied by said pump, a pressure switch in the motor circuit responsive to the fluid pressure in the reservoir, means for unloading the pump, said unloading means being biased to inoperative position, and a slowly yieldable mechanical connection between said switch and said unloading means whereby the closing of said switch renders the unloading means operative.

6. In combination, an electric motor, an air compressor driven thereby, a reservoir supplied by said compressor, a pressure switch in the motor circuit responsive to the fluid pressure in said reservoir, means for unloading the compressor, and a mechanical connection between said pressure switch and said unloading means whereby the latter is mechanically operated by the closing of said switch.

7. In combination, an electric motor, an air compressor driven thereby, a reservoir supplied by said compressor, a pressure switch in the motor circuit responsive to the fluid pressure in said reservoir, means for unloading the compressor, said unloading means being biased to an inoperative position, and a slowly yieldable mechanical connection between said pressure switch and said unloading means whereby the latter is mechanically operated by the closing of said switch and is automatically rendered inoperative a predetermined time thereafter.

8. In combination, an electric motor, an air compressor driven thereby, a reservoir supplied by said compressor, a pressure switch in the motor circuit controlled by the pressure in said reservoir, means for unloading said compressor, said means being biased to an inoperative position, and a mechanical connection between said unloading means and said switch.

9. In combination, an electric motor, an air compressor driven thereby, a reservoir supplied by said compressor, a pressure switch in the motor circuit responsive to the fluid pressure in said reservoir, means for unloading the compressor, a slowly yieldable mechanical connection between said pressure switch and said unloading means whereby the latter is mechanically moved to an operative position by the closing of said switch, and means for automatically causing the yielding of said mechanical connection to render said unloading means inoperative a predetermined time thereafter.

10. In combination, a motor, a pump driven thereby, a reservoir supplied by said pump, means controlled by the amount of the fluid in said reservoir for controlling the supply of power to the motor, normally inoperative means for unloading said pump, and a mechanical connection between said power-controlling means and said unloading means for moving the latter to an operative position by the movement of said power controlling means to power-admitting position.

11. In combination, an electric motor driving a load, a switch for admitting current to the motor, means for unloading the motor, said means being normally inoperative, and a mechanical connection between said switch and said unloading means for rendering the latter operative upon the closing of the switch.

12. In combination, an electric motor driving a load, a switch for admitting current to the motor, means for unloading the motor, said means being biased to inoperative position, and a slowly yieldable mechanical connection between said switch and said unload-

ing means for rendering the latter operative for a predetermined time upon the closing of said switch.

13. In combination, an electric motor driving a load, a switch in the motor circuit, means for unloading the motor, a slowly yieldable mechanical connection between said switch and said unloading means for rendering the latter operative upon the closing of the switch, and means for causing the yielding of said connection to render said unloading means inoperative a predetermined time after the switch is closed.

14. In combination, an electric motor driving a load, an automatically controlled switch for making and breaking the motor circuit, means for unloading the motor, said means being biased to inoperative position, and a mechanical connection between said switch and said unloading means for rendering the latter operative upon the closing of the switch, said mechanical connection including a device which yields to render the unloading means inoperative after a predetermined time after the closing of the switch.

In testimony whereof I affix my signature, in the presence of two witnesses.

ROBERT B. WILLIAMSON.

Witnesses:
H. C. CASE,
CHAS. L. BYRON.